methods of prophylaxis to reduce the rate of reoperation further, total costs would increase overall. For departments that performed more than 100 initial operations a year the cost of reoperation could be reduced to a minimum by using a combination of the surgical enclosure and exhaust ventilated suits.

Figure 4 shows that parenteral antibiotic prophylaxis alone invariably costs less for each initial operation than any other method, regardless of the number of operations performed each year. A combination of the use of parenteral antibiotics and an ultraclean air system was less expensive than a combination of parenteral and local antibiotic prophylaxis, but only when more than 130 operations were performed each year in a department with a single surgical enclosure.

Discussion

As a patient, a citizen, and a tax payer one should demand more from the health services than merely keeping costs to a minimum. The value of health itself should also be considered. Despite this there is still no consensus about the correct value to be placed on health when evaluating health care programmes. In order to indicate the effects of taking this important element into account we simply assumed that the loss of health from deep sepsis incurred a cost of an additional Kr 97 000. This value was not chosen arbitrarily. There are areas other than health care in which decisions are taken that affect people's health, one being traffic planning and investment in roads; the Swedish National Road Administration, for instance, adds Kr 100 000 to the cost of treatment after a typical, serious road accident when calculating the value of preventing that accident.[9]

By assuming a value of health similar to that used in decisions affecting road safety, the total cost of loss of health, prophylaxis, and reoperation is increased and an economic optimum established at a point where the rate of reoperation would be about 0·5% (fig 5). Using a combination of parenteral and local antibiotics would be a cost effective means of reducing infection in departments that performed less than 100 arthroplasties each year. For departments performing 100 or more a combination of parenteral antibiotics and operating in the surgical enclosure would be the most attractive means of prophylaxis from the social point of view.

These results, however, should not be considered to be final, because the value put on health for the purpose of traffic planning may not be directly applicable to the evaluation of prophylaxis for patients undergoing total joint replacement. The value should be adjusted to take account of differences in age and survival rates. Nevertheless, the use of a value explicitly assigned to loss of health implies a willingness to minimise not just the costs of health care but all costs associated with total joint replacement.

The data on the costs of prophylaxis and reoperation used in this study are specific to Sweden. The conclusions to be drawn from the analysis may, therefore, be slightly different for other countries. The model, however, is general and could be used by any hospital department that wanted to calculate the most cost effective method of prophylaxis against infection for patients undergoing total joint replacement. Various local options could be tested by supplying the model with the relevant information. If the relation between the cost of prophylaxis and the cost of reoperation is the same as the one we have calculated the conclusion will be the same as ours. When estimating the economic optimum costs should preferably be based on the total number of arthroplasties, provided that the costs of reoperating on the knee and the hip are the same.

References

1 Ahnfelt L. Reoperated total hip arthroplasties in Sweden, 1979-1983. Gothenburg: University of Gothenburg, 1986. 207 pp. (Dissertation.)
2 Knutsson K. The failed knee arthroplasty. Lund: University of Lund, 1985. 52 pp. (Dissertation.)
3 Borgqvist L, Lidgren L, Lindberg L. Operationsbox eller antibiotikaprofylax? En jämförelse. *Läkartidningen* 1978;75:1705-6.
4 Lindberg L. Tre likvärdiga alternativ bakom sänkt infektions-frekvens vid totala ledplastiker. *Läkartidningen* 1983;80:134-6.
5 Swedish Planning and Rationalization Institute of Health and Social Services (SPRI). Operationsboxar. Stockholm: SPRI, 1981. (SPRI Report 71.)
6 Lidwell OM, Lowbury EJL, Whyte W, Blowers R, Stanky SJ, Lowe D. Effect of ultraclean air in operating rooms on deep sepsis in the joint after total hip or knee replacement: a randomised study. *Br Med J* 1982;285:10-4.
7 Lidwell OM. The cost implications of clean air systems and antibiotic prophylaxis in operations for total joint replacement. *Infect Control* 1984;5:36-7.
8 Josefsson G, Lindberg L, Wiklander B. Systemic antibiotics and gentamicin-containing bone cement in the prophylaxis of postoperative infections in total hip arthroplasty. *Clin Orthop* 1981;159:194-200.
9 Persson U. *Relativ värdering av hälsa. Jämförelse mellan vägverkets och sjukvårdens metoder.* Lund: Swedish Institute for Health Economics, 1984. (IHE Report No 3.)

(Accepted 10 July 1987)

Everyday Aids and Appliances

JEFFREY S HILLMAN

AIDS FOR LOW VISION IN THE ELDERLY

Although visual impairment is not caused by increasing age alone, low vision is common in the elderly. The commonest causes of registration of visual handicap are macular degeneration, glaucoma, cataract, and diabetic retinopathy. Many elderly patients with failing vision fear the progression to total loss of sight, and explanation and appropriate reassurance are most important. Emphasise that the eyes do not "wear out" from overuse and the patient can continue to read without harm. Reassure the patient with macular degeneration that, although the detailed central vision used for reading may be lost, the peripheral vision which is important for mobility is usually retained and independence need not be lost.

Several aids are available from most major hospital eye departments and from some opticians, but all do require effort and application by the patient if they are to give worthwhile benefit.

Department of Ophthalmology, St James's University Hospital, Leeds LS9 7TF
JEFFREY S HILLMAN, FRCSED, DO

Spectacles

It is important that spectacles should be from a recent prescription, and refraction should be checked by an optician about every two years if vision is stable. The power of the reading lenses can be increased to give effective magnification, but as the lenses are strengthened print must be brought closer to the eyes and the positioning of reading matter is critical. The patient must be encouraged to move the print to and fro to find the best distance as print will be out of focus at normal reading distance.

Useful telephone numbers

Royal National Institute for the Blind: 01 388 1266
North Regional Association for the Blind: 0532 752666
South Regional Association for the Blind: 01 722 9703
Talking Newspaper Association for the UK: 04352 6102

Lighting

The most valuable but least appreciated visual aid is a (60 W) reading light over one shoulder. This usually enables the patient to read at least one size smaller type than with a good ceiling light alone.

Magnifiers

A wide range of magnifiers can be borrowed from hospital eye clinics or bought from opticians, and the patient must be tested to find the most suitable. Stronger magnifiers give increased magnification but at the expense of a closer focus and a reduced field, making it easier for the user to lose the place on the page. The best magnifier is the weakest one which, together with reading spectacles and a good light, enables the patient to read comfortably. The distances between the eyes and the magnifier and the magnifier and the page are critical and the patient must be encouraged to find the best positioning.

A reading light and hand magnifier are the most helpful visual aids.

For the unsteady hand, a stand magnifier is easy to place at the correct distance from the page, and for the small print in the telephone directory a cylinder bar magnifier helps by elongating the numbers. For tasks requiring the use of both hands, such as knitting, a magnifier held on the chest by a neck cord or held on an adjustable arm can be useful.

Other low visual aids

There are also more sophisticated (and expensive) low visual aids, which are in the form of a high power lens button carried on a spectacle lens or a telescope lens system mounted in one eyepiece of a spectacle frame. The latter gives magnification with less shortening of the working distance than a simple lens but still needs accurate positioning for real benefit. These aids need specialist testing and are available on free long term loan for hospital eye clinics. Closed circuit television systems are an efficient way of presenting reading matter enlarged without distortion on a television monitor. The high cost may be borne by the Manpower Services Commission if necessary to obtain or maintain a patient in employment.

Large print books

A good selection of books set in large type is available without charge from public libraries, which either hold a stock or will order them for readers.

Main causes of blind registration in those aged 65 years or older

Macular degeneration	Cataract
Glaucoma	Diabetic retinopathy

Talking books

Patients who cannot attain reading vision (N12) may appreciate a talking book, which is available on free loan from social services departments on the recommendation of any doctor; visual handicap registration is not necessary. It is a large tape recorder which accepts special cassettes of a wide range of books. For a small subscription there are also locally organised talking newspaper services coordinated by the Talking Newspaper Association, which provide a postal service of an extensive range of newspapers and magazines on standard audio cassettes. Postage is free for those who cannot read.

Management strategy

Explanation and reassurance	Low visual aids
Spectacles	Large print books
Lighting	Talking book
Magnifiers	Visual handicap registration

Visual handicap registration

If vision falls to a level which significantly handicaps the patient it may be appropriate for a consultant ophthalmic surgeon to certify the patient as "partially sighted" or "blind" so that the patient may register with the social services department. *Partial sight registration* implies that the patient is "substantially and permanently handicapped." After registration the patient should be visited by a trained rehabilitation officer who will advise on ways of coping with everyday problems of daily living, mobility, communication, and so on. *Blind registration* implies that the patient is "so blind as to be unable to perform any work for which eyesight is essential." In addition to the advice of a rehabilitation officer, there is increased entitlement to social security benefit and attendance allowance, disabled person's carparking badge (for the patient's carer), free radio, reduced TV licence fee, and the blind person's income tax allowance.